Attachment 9

Tank Treatment

9.130 Description of the Treatment Process

The critical parameter for treatment is pH. Monitoring of pH is essential to ensure precipitation of dissolved metals for the wastewater. pH probes are located immediately downstream of the two chemical feed points. The data from the pH probes along with the adjacent flow meter is used to control the chemical feed at the respective metering pumps. Based on the pH of the wastewater, NaOH is added to raise pH to a desired level (between 9.5 - 11), creating an environment for precipitation where required. Once the metals are removed from the wastewater, sulfuric acid is added to lower the pH prior to its discharge through the deep well injection system. Again, the pH probe immediately downstream of this feed point monitors the pH of the treated stream and subsequently relays the information to control the feed at the sulfuric acid metering pumps.

The pH probes as well as the metering pumps are routinely calibrated as part of the regular maintenance schedule to insure the accuracy of the respective devices.

Treatment at this facility is accomplished in a batch process, and entails removal of dissolved metals and suspended solids from the waste stream before the effluent is discharged underground via a deepwell injection. The treatment is based on a 12 hr/day operation with a maximum of 12 batches per day. The maximum treatment volume per batch is designed at 16,670 gallons or at a rate of 278 gallons per minute (gpm).

Operation at the Receiving Station

The receiving station at the head of the plant is equipped with total of six (6) non-metallic centrifugal pumps. As previously mentioned, the pumps are designated to handle wastes arriving at the plant according to its characterization. The six centrifugal transfer pumps (TP-1 through 6) are designated such that TP-1 and TP-2 handle acids, TP-4 and TP-5 handle bases, TP-3 handles

brine solution, while TP-6 handles incompatible wastewater.

The delivery process entails discharging the contents of the arriving containers into one of the ten receiving tanks (RT-1 through 10). RT-1 through 4 are designated to handle acids, RT-5 through 8 to handle bases, RT-9 to handle brine and RT-10 to handle incompatible waste. These tanks are located within concrete containment areas. The transfer pumps designated above are connected to pump directly to the respective designated tanks, i.e. TP-1 and TP-2 pump to any tank, RT-1 through 4; TP-4 and TP-5 to any tank, RT 5 through 8; TP-3 to RT-9 and TP-6 to RT-10.

During normal operations, trucks and railroad tankers arriving at the plant are directed to appropriate ports for delivery.

Controls

- Pumps TP-1 to TP-6 can only be started manually/locally by an operator. The RT is selected. The pumps can be shut down remotely at main control panel. If shut off at the main control panel, the pumps cannot be started locally.
- Pump status is monitored at the local and main control panel.
- Emergency pump shut down can be accomplished at local panel.

Interlocks

- Pumps are interlocked with level sensors and influent and effluent valves of tanks respectively.
- For pumps to operate, the following conditions need to be satisfied:
  1. Level of selected tank is lower than set point.
  2. Valve V1 of selected tank is open.
  3. Valve V2 of selected tank is closed.

Indication

At the local panel/main panel the following indications are monitored:

- Tank levels
- Valve positions
- Pump status
- All alarms from RT- 1 through RT-6

Alarms

At the local and Main Panels, the following alarms are included:

- High level of all tanks
- Leak detection within containment

Receiving Tanks

Filling the receiving tank is the beginning of the treatment process. As stated earlier, to prevent unwanted mixing of wastewaters, the treatment of wastewater is accomplished in two parallel process trains, one for acids, and one for bases, respectively. The brine and incompatible wastewater are stored separately, but use one of the two trains for treatment.

Wastewater from each source is stored separately in the respective tanks and only mixed with wastes from other sources once the compatibility of the two wastewaters are assured. All tanks are located within containment areas that are enclosed within minimum four feet high walls. Each containment area includes a sump vault, approximately two feet deep, and is equipped with leak detection and level sensor equipment to be used to alert the operator of the presence of liquids in the containment area. Wastewater Sump pumps (WSP) with hose connections are provided to discharge wastewater collected in these sumps to one of two destinations, an adjacent process tank or the Rinse Water Waste Vault (RWWV).

The valves interconnecting the various pumps for other waste trains are normally closed and

locked, and only opened manually on emergency occasions, as the operator desires. However, prior to this operation, the tanks and pumps, including the suction and discharge pipes will be thoroughly flushed with water. The rinse water shall be drained into the RWWV, located in the area, south of the NaOH storage tank.

Spills collected in a containment area will be pumped into a tank within its train containing compatible wastewater. If, upon sampling, the spilled wastewater is found to be compatible, the wastewater will be pumped to the RWWV. The flow will be pumped to the RWWV by hoses connected to the WSP. The contents of the RWWV will be pumped on a daily basis, into RT-lO for treatment through the process. The risk of any detrimental effects from mixing of various wastes in the RWWV is minimal since most wastewater arriving at this tank would be completely diluted with water that is flushed along with it.

Operation Procedure for the Receiving Tanks

TP-l and TP-2 are able to discharge to either of the four designated receiving tanks (RT-l through 4). However, the tanks are designed such that RT-l and RT-2 are connected at the top to accommodate overflows between them during emergency conditions. The inlet to these tanks (discharge end of the transfer pumps) is regulated by motor operated fail closed, influent valves, (RT1-V1, RT2-Vl, RT3-V3, RT4-V4) designed to close during power failure The valves are interlocked with related transfer pumps and level sensors for those respective tanks. The pumps pump to the tank until the delivery source is empty, at which point the operator shuts the pump off. Shutting the pump off signals the influent valve to close.

Level sensors are designed for each tank to indicate a high water level which are set at one foot below the overflow level. High Level indication automatically shuts off the influent valve for the tank and opens the influent valve for the next tank in that series. In case the influent valve fails to close, the wastewater will be allowed to overflow into the next tank in its series. Compatibility

testing is performed before any overflow is allowed into adjacent tanks. The high water and the overflow condition are enunciated.

Similar operations are maintained for tanks RT-3 and RT-4 and the base tanks RT-5 through RT-8, using related transfer pumps and influent valve configuration. The brine and incompatible storage tanks (RT-9 and RT-1O) act independently.

Initiation of Treatment Process

As the process is run in batches, the operator is free to start a batch treatment process when any of the receiving tanks are full. Since there are two separate treatment trains, two separate batches for each kind of wastewater can be treated simultaneously. Prior to initiating treatment, the operator will select the necessary pumps and tanks that are to be brought on-line during treatment. Brine and incompatibles have the choice of being treated in either train. However, prior to such operations, the units and associated piping for the trains will be thoroughly rinsed with water, with the rinse water being drained and stored in RWWV.

Oil/Water Separators (OWS)

The OWS units are flow through process equipment designed to remove oil and grease from the wastewater. OWS-l operates along the acid train and OWS-2 with the base train. Pumps P-1 and P-2 are designated to pump from the acid and base receiving tanks, respectively, to the respective oil water separator tank (OWS-1 and OWS-2). The pumps are driven by a variable speed drive (VSD) motor, regulating an uniform flow though the OWS. The flowmeter located immediately downstream of the pumps, P-1 and P-2, monitors flow into the OWS. Either of these pumps are available for pumping from the brine or incompatible storage tank, provided that the pumps and pipes are thoroughly flushed. The valves interconnecting the two trains will be manually operated and normally closed.

The oil and grease removed from the waste stream will be collected in the reservoir located below each OWS unit, and removed periodically to the loading dock for disposal at a hazardous waste landfill, or recycled, if possible.

Operation Procedures for Treatment through the Oil/Water Separators

The batch process is initiated with the operator selecting the treatment train process pumps (P-1 or P-2, depending in the train) to pump wastewater from the receiving tanks to its respective OWS unit within its train. This selection will automatically initiate the effluent valves of the respective tanks (RT1-V2 to RT1O-V2) of that RT to open, allowing the pumps to discharge its contents to the OWS. If the valves at the influent of the RT are not shut during this operation, the activation of these process pumps will automatically shut off the former valve. The effluent valve RT-V2, of any RT will open automatically only if its influent valve is shut off if the effluent valve fails to open with the activation of the pumps, an alarm will sound, attracting the operator's attention. During emergencies, these valves can be manually operated.

Activation of the either pumps, P-1 or P-2, will automatically activate pumps P-3 and P-4, respectively, that are located downstream from the OWS and used to pump to the Primary Settling Tanks (PST 1 through 6).

Sludge accumulating at the bottom of the tanks is discharged into the sludge storage tanks (ST-1 and ST-2). Sludges from either treatment train is directed to its designated sludge storage tank. The operator manually activates the sludge pumps (STP-1 or 2 or OWS-1 and 2, respectively) to enable this process. The pumps are interlocked with the level sensor in the OWS to shut down at low level. The pumps can be shut down manually.

Operational Controls (Typical for both trains)

Manual Controls at the Main Control Panel (MCP)

- Activation of pumps P1 and P3 (auto/hand/local)
- Operation of Influent and Effluent valves (auto/hand/local)
- Operation of STP-1 (manual/local)
- Speed adjustments of P1 and P3 (auto/remote)

Automatic Operation at MCP

- Flow control (controller, flow meter and speed of P1 and P3)
- Speed of Pl and P3

Interlocks

- P-1and P-3, F-E controller
- Level sensor to Nitrogen Blanket
- SF-1 to level sensor

Alarms at MOP

- High level
- Low level

Status @ MCP

- P-1 and P-3 (ON, OFF, speed)
- Valves OWS1-V1, OWS2, V2 (open, closed)
- STP-1 (ON, OFF)
- Flow controller (set pint, process, manual, auto, remote)

Primary Settling Tanks

The six primary settling tanks are designed identical in size and shape. These tanks function in allowing solids to settle to the bottom, from where it is pumped to the sludge storage tank. The inlet and outlet valves of each tank are valved individually using motor controlled valves. The tanks within each train are interconnected on top via a valved overflow pipe.

Since more acid based wastewater is expected at this plant, three tanks (PST- 2 through 4) are designated for the acid train, while only two (PST-5 and PST-6) are allotted for the base train.

Depending upon the characteristics of the wastewater, these process units can be bypassed.

Operating Procedures for Treatment through the Primary Settling Tanks

The primary influent pumps P-3 and P-4 serve the acid and base trains, respectively. These pumps pump the contents of the OWS to the PST. The valve operation and treatment process are similar to the RT. The activation of pumps P-3 or P-4 will automatically open valve PST1-6 at the influent of the chosen PST for that particular train. At the high water level, the level sensor signals to shut off the valve, while activating the valve of the next tank to open. The effluent valves would normally be in the off position.

Sludge from the PST is removed as desired by activating the STPs and opening appropriate valves. The sludge operations are similar to the those of the OWS. Sludge pumps (STP-3 and STP-4) are associated with the base and acid trains, respectively.

Operational Controls (Typical for both trains)

Manual Controls at the Main Control Panel (MCP)

- Activation of pumps PS and P7 (auto/hand/local)
- Operation of Influent and Effluent valves (auto/hand/local)
- Operation of STP-3 (manual/local)
- Speed adjustments of P5 and P7 (auto/remote)

Automatic Operation at MCP

- Flow control (controller, flow meter and speed of PS and P7)
- Speed of P5 and P7

Interlocks

- P-S and P-7, F-B controller
- SP-l to level sensor

Alarms at MCP

- High level
- Low level

Status @ MCP

- P-S and P-7 (ON, OFF, speed)
- Valves PST1-V1, PSTV1-V2 (open, closed)
- STP-3 (ON, OFF)
- Flow controller (set point, process, manual, auto, remote)

pH Adjustment and Clarifications

To continue the treatment batch process, after a required detention time in the PST, the PST effluent pumps, P-5 and P-6, for the acid and base trains, respectively, are used to pump the primary effluent to the flocculation tanks (FFT- 1 and 2) and subsequently to the inclined plate clarifies (IPC-1 and 2). These pumps are designed as variable speed drive (VSD) pumps, capable of maintaining a uniform flow from the PST into the downstream treatment units. The flow is monitored by the flowmeter at the discharge head of the pumps, P-5 and P-6. Prior to entering these tanks, sodium hydroxide (NaOH) is added (as necessary) to the primary effluent discharge line and thoroughly mixed by the in-line static mixer, located in the discharge pipe, just ahead of the FFT. NaOH is added to raise the pH to the desired level to initiate metal precipitation, if required. This pH is maintained at 10 or 11, if required. A sample analyzer and a flowmeter is located immediately downstream from the feed point. The control system is designed to control NaOH dosage by controlling the metering pumps.

The NaOH feed system consists of a storage tank storing 50% NaOH solution along with two metering pumps to feed the solution into the process. The signal from the analyzer and flowmeter are used to control the chemical feed system in determining the amount of chemical that needs to be fed to achieve the desired pH.

Polymer may be added to the wastewater in the FFTs to aid the flocculation and precipitation process. The polymer feed system consists of a liquid feed unit (e.g. polyblend type unit) with associated metering pump to feed the chemical. The polymer is added based on a preset dosage based on the flow-rate. The wastewater after being thoroughly mixed with the polymer in the FFT is allowed to move on to the IPC (1 or 2 depending on the chosen train). At the IPC, metal precipitates are removed from the waste stream. The accumulating sludge from these flocs settles to the bottom of the tank, from where they are discharged into the ST. The operation of the sludge pumps (STP-5 and STP-6) are manually conducted, similar to the other equipment.

Operation Procedures for Flocculation and Clarification

PST effluent pumps P-5 or P-6 activate automatically upon a brief lag in activation of P-3 or P-4. This lag time is usually maintained at the detention time in the PST. The activation of the effluent pumps (P-5 or P-6) automatically opens the valve at the effluent of the chosen primary tank. The interlock between the influent and effluent valves in the PST are similar to that of the RT. The effluent valve automatically shuts off when the PST effluent pumps are turned off. On the other hand, the influent valve at the head of the FFT, which is normally closed, is activated to turn open when either P-5 or P-6 is activated to run.

Filtration

In continuing with the treatment process, effluent from the IPC is discharged to the cartridge filters (CF-1 and CF-2) for filtration. Filter pumps P-7 and P-8 are designed to overcome the head across the filters (CF) and are interlocked with pumps P-5 and P-6. After treatment of the wastewater in the IPC, the effluent from either train shares the same units through the rest of the treatment process.

Operation Procedures for Treatment through Cartridge Filters (CF)

P-7 or P-8 are activated to discharge from the IPC to either of the CFs. These pumps activate automatically after a brief lag period upon activation of the PST effluent pumps. This lag time is usually the time involved in the flocculation and clarification process. Isolation valves at the influent (normally open) of the Filter units will be manually operated. All process water arriving at this facility is required to pass through either one of these filter units.

pH Adjustment and Secondary Storage

The filter effluent is directed to the Secondary Storage Tank (SST). Prior to entering the SST, Sulfuric acid (H_2SO_4) is added to the treated wastewater to lower the pH in the effluent as required. The chemical is thoroughly mixed with the wastewater in the in-line static mixer located immediately downstream from the feed point. Similar to the NaOH feed system, a sample analyzer and a flowmeter is located immediately downstream from the mixer. Signal sent from this analyzer to the chemical metering pump is used to maintain the feed rate of the chemical feed unit.

Operation Procedure

The activation of the filter influent VSD pumps (P-7 or P-8) initiates the chemical feed unit. During emergency conditions, SST can be bypassed directly to the deep injection wells by manually operating the influent valves at the SST. Under normal conditions, valve SST1-V1 at the influent of the SST automatically turn on when the filter influent pumps are activated. Similar to the other tanks, when the high water level is sensed, SST1-V1 is turned off. In case the valve malfunctions to operate automatically, an alarm will be enunciated at the overflow level. An overflow pipe at this tank will allow to let flow within the double containment wall into the containment area. Wastewater collected in the containment area will be washed down with water and allowed to drain into the RWWV. A high level condition will automatically activate alarm and shutoff the influent pumps.

Discharge to the Injection Wells

Effluent discharge pumps (P-9 and P-10), located immediately downstream from the SST, are used to pump treated wastewater to the injection wells. These effluent pumps are manually operated thereby automatically opening the SST effluent valve, SST1-V2. The operation of this valve is similar to the effluent valves at other tanks at the plant. Prior to discharge into the

injection wells, the effluent is passed through another system of cartridge filters(CF-3 and CF-4) to remove fine matter that may impact the injection well pumps. The deactivation of P-9 or P-10 will automatically turn off the valve at the effluent of the SST.

Wastewater Processing in the Loading Dock

Wastewater arriving at the plant in containers are stored on-site. The wastewater from these containers is treated through the treatment system. The dock area is provided with a curbed process area. The containers are moved into the curbed area for pumping their contents into one of the available RT, depending on its characteristics amid compatibility. The curbed area is designed to store a volume equal to more than that of one full container. Three transfer pumps are provided in this zone to pump from the containers to the RT influent. The containers are processed when the respective RT are available for processing.

Sludge Management

Sludge generated during the process in the OWS, PST and the IPC are pumped into the ST, as previously described. Diatomaceous earth is added to the ST to help in thickening the sludge. The thickened sludge is pumped to the Filter Press (FP-1) for dewatering. The dewatered sludge is stored in roll-off boxes and disposed off-site in a hazardous waste landfill or other acceptable disposal sites. Supernatant from the ST and the filtrate from the PP are drained off and diluted with the water in the RWWV.

Because of very small volume expected in the form of incoming incompatible waste, the sludge volume is expected to be rather small.

Sludge Operation

Sludge treatment is carried out at least once a working day. The operator initiates the treatment process when the sludge blanket in either of the sludge producing units is thick. The sludge is pumped (via the STP) into ST-1 or ST-2. Activation of the STP for any unit automatically activates the Diatomaceous Earth feed unit. The feed rate is pre-determined. Upon a brief thickening period, the operator may choose to activate one of the sludge pumps (SP-1 or SP-2) that is used to discharge directly to the FP units. The pumps are designed to pump to and from either of the FP or ST units. The dewatered sludge will be stored in the roll-off boxes and hauled off site on a weekly basis, as required.

The sludge dewatering process control is accomplished using an independent, stand alone control system with necessary interlocks, alarms and safety devices.

Rinse Water Wash Vault (RWWV)

The RWWV is designed to receive rinse water from floor drains, containment areas, and flushing treatment units and supernatant and filtrate from sludge operations. The RWWV is an underground storage tank, located just south of the H_2SO_4 tank. The contents of this vault are pumped to either of the tanks RT-7 through RT-9 for processing through the plant. Two submersible pumps are located in this vault to feed this rinse water to the influent of the RT.

Level sensors in the tank monitor the levels in the vault. A high level sensing of the water level produces an alarm to alert operator's attention. The operator opens necessary valves and starts pump to enable discharge of its contents receiving tanks. An overflow pipe from this valve is connected to the outside stormwater runoff tank.

Depending upon characteristics of the wastewater, the contents of RWWV can be pumped directly into the deepwell after filtering.

Stormwater Runoff Vault (SWRV)

The stormwater runoff vault is located east of the loading dock area, outside of the treatment building. This vault is designed to capture runoff flows from the immediate vicinity of the building, exposed to their treatment process and rinse and wash water from the receiving station. The vault is located underground, and lined with corrosion inhibitors. The operation of this tank is similar to that of the RWWV. The contents of this tank are similarly treated through the system.